

LNG Screw Down Non-Return Valve

Installation, Operation and Maintenance Manual

Reference Number:	IOM 030	Date:	January 2015	Issue:	A
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WARNING!

**BEFORE ANY INSTALLATION AND MAINTENANCE WORK CAN
COMMENCE ENSURE THE VALVE AND SURROUNDING SYSTEM IS
DRAINED OF PRESSURE AND ISOLATED.**

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Disclaimer

PLEASE NOTE:

If the valves produced by Bestobell Marine are refurbished by a third party organisation that is not approved by Bestobell Marine, then the safety and performance will not be guaranteed and the warranty may be invalid.

If unsure about the installation and operation procedures for this valve, please contact Bestobell Marine.

Bestobell Marine has produced this manual in order to provide engineering personnel with sufficient general information to enable the operation, installation and effective maintenance of the valve manufactured by Bestobell Valves.

In the interest of product development, the designs and specifications for our products are constantly under review and we therefore reserve the right to make changes and improvements without notice.

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This document has been authorised for use by:

Name:	M. ROBINSON
Title:	ENGINEERING MANAGER.
Signed:	<i>M. Robinson</i>
Date:	20/1/15

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Introduction

Outline

This manual is broken down into separate sections:

- **Introduction**

This section provides information about important safety requirements as well as highlighting the precautions taken at Bestobell Valves to ensure the cleanliness of our products. Details regarding servicing are also introduced.

- **Installation**

This details the method of installing the valve on site, and includes information on storage, unpacking and inspection. Preparation of the valve and site is also discussed to allow ease of installation and operation.

- **Hardware Description**

Introduces the product as well as providing a more detailed description including operating conditions and suitable media. Any further requirements for the effective operation of the valve are also discussed.

- **Maintenance**

Provides information relating to the on-site maintenance of the supplied valve, as well as discussing common problems and solutions.

Safety

Read and understand these instructions before installing the valve. Improper installation, operation or maintenance by the owner or operator of this valve can result in personal injury.

Only use genuine Bestobell Marine spares to ensure safe and optimum performance.

Prior to the installation of the valve into the system and any maintenance work, ensure the system is de-pressurised and isolated for the duration of the installation and during any subsequent maintenance.

The valve must be installed within a system that has adequate draining and venting provisions.

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In cryogenic applications the area of pipe-work to receive the valve must be allowed to reach ambient temperature.

It is essential that the installers and operators are conversant with all of the safety issues relating to the medium within the system, and are fully trained to an adequate standard.

Wear safety glasses and gloves during any installation or operation of the valve.

Valves must only be used in a circuit protected by suitable equipment.

The valve should be inspected for wear as part of a regular system maintenance programme.

Cryogenic burns can occur if the valve is handled during or after the valve has operated.

Minor leaks from the outlet side of the valve, if allowed to build up in a confined area, can be hazardous. This can be avoided by dissipating into the atmosphere or a well ventilated area.

If valve is to be installed in hazardous climatic conditions or seismic areas, please inform Bestobell Marine.

Identify the intended flow direction and match the valve orientation with its flow direction arrow.

Ensure that all end connections to the valve are in line and that the pipe work is supported to reduce unwanted stresses, loading and vibration on the valve and system pipe work.

Safety

Ensure that all joining materials / components used during the installation of the valve are compatible, and will not cause any deterioration to the valve structure.

Never use hands to test for leaks!

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Cleanliness

Immediately after assembly in a controlled clean room, the valve is sealed in an airtight plastic bag to maintain cleanliness. As such, it is essential to maintain this cleanliness throughout all stages of installation. Particular care should be taken not to contaminate the internals of the valve with grease, moisture, grinding dust, weld/brazing spatter etc.

Clean practices will save time later with reduced 'flushing' and maintenance.

Service Intervals

Bestobell Marine recommends that a major service is carried out on its valves in line with the procedures contained in this manual every 2 years.

Regular inspections are suggested on a monthly basis and maintenance work should be carried out in line with this service manual.

It is recommended that the Service Record Sheet enclosed be fully completed at every service interval.

Installation

Personnel carrying out Assembly / Joining / Welding / Inspection must be adequately trained and hold the necessary approvals.

Ensure that environmental conditions (atmospheric pollution) are compatible with the valve materials.

(NOTE: Ensure there is enough space around the valves installed position to allow the removal and refit of the headwork / valve)

Installation Overview

The quality of performance in service is a function of the care taken to ensure good installation. A careful study of these instructions is therefore recommended, as properly installed equipment will normally operate for long periods without problems.

The most critical point in the lifetime of a valve is the time of installation, therefore, proper care at this stage and during any maintenance will increase the probability of trouble free valve service.

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It is important to maintain cleanliness throughout all stages of the installation, with particular care being taken not to contaminate the internals of the valve with grease, moisture, grinding dust, weld / brazing spatter or other foreign matter.

Clean practices will save time later with reduced 'flushing' and maintenance.

STORAGE:

The equipment packing cases are **NOT** waterproof and should be stored in a weatherproof location before use.

UNPACKING:

It is recommended that before any item is unpacked, it should be moved as close as possible to its installed position. This will minimise the possibility of damage during handling.

It is further recommended that each item should only be unpacked immediately before it is required.

Before installation the engineer should check for:

- Damaged Packaging
- Bent or Distorted Items
- Scratches, Dents or Damage

Particular attention should be paid to the sealing faces on the end connection flanges.

TOOLS REQUIRED:

No special tooling is required for the installation of this valve.

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Preparation

WARNING!

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Remove the headwork before installation and cover the top of the body to protect the internals of the valve from particulate contamination.

Also ensure that enough room is left above / around the valve for the headwork once this is replaced after installation.

Identify the intended flow direction and match the valve orientation with its flow direction arrow.

Ensure that all end connections to the valve are in line and that the pipe work is supported to reduce unwanted stresses, loading and vibration on the valve and system pipe work.

Ensure that all joining materials / components used during the installation of the valve are compatible, and will not cause any deterioration to the valve structure.

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Hardware Description

All materials used are selected for their suitability to function at cryogenic temperatures. All valves are degreased for oxygen duty, assembled in clean room conditions, and sealed in robust polythene bags prior to despatch.

Working Pressures Up to: 50Bar (725psi).

Temperature Range: +80°C to -196°C or + 150°F to -320°F

Only suitable for operation with media: - LNG

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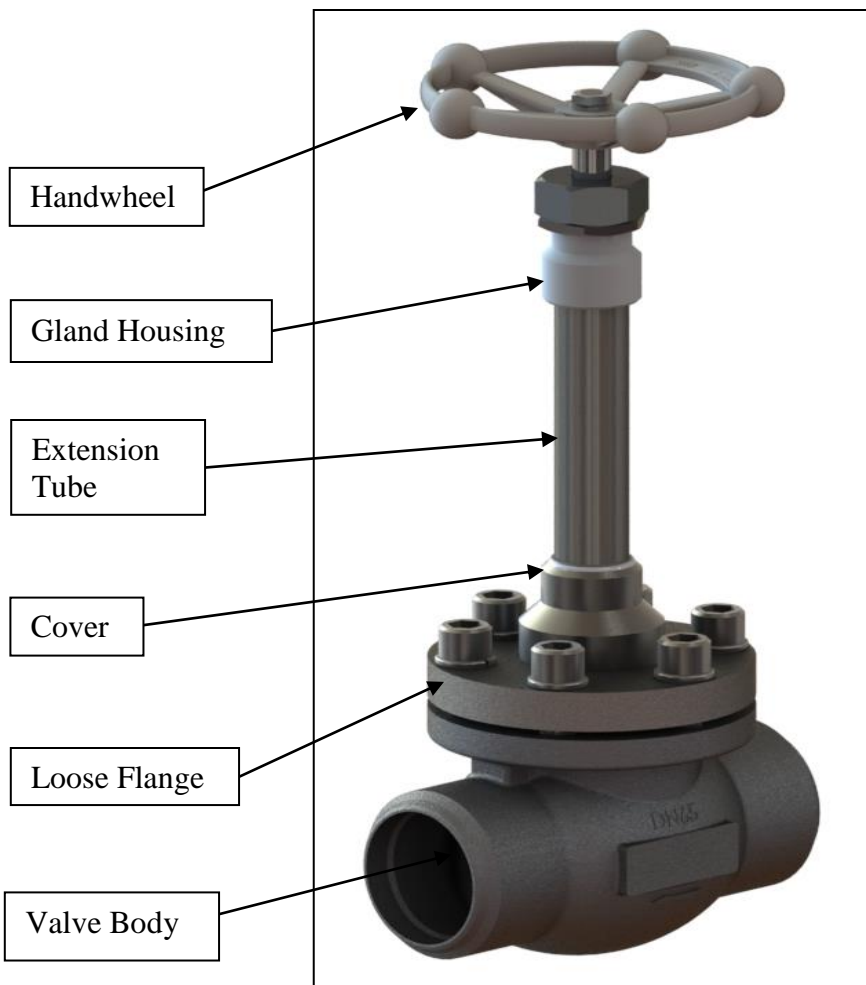
Hardware Description

Manual Globe Valve

Stainless steel extended globe valve with bolted bonnet and integral metal seat. Available with butt weld and flanged end connections, the valve has a conical seat design for a fire safe shut off. A Screw down Non-Return version is also available. The bolted bonnet allows for simple site maintenance, with easy access to the serviceable parts of the valve.

The valve is operated by a handwheel. The handwheel is turned clockwise to close the valve and anti-clockwise to open it.

**Figure A – Manual
Globe Valve**



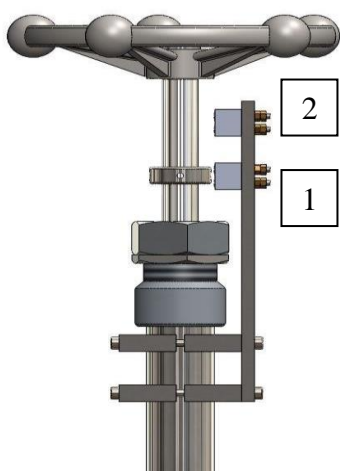
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ELECTRICAL CONNECTION: LIMIT SWITCH TYPE VALVES

Open and Close Limit Switches (ON/OFF) These switches give a position feedback to a control room to indicate the valve open or close. The switch is EX approved to ZONE 0 and are a 24vdc 2 wire type. Below is an example of how the manual limit switch works.

Switch Outputs - Manual Valves



Closed

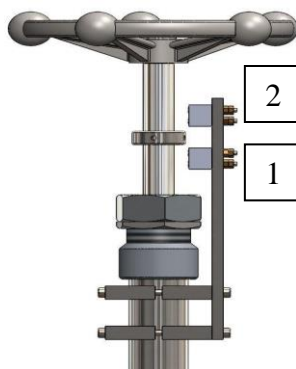
Switch 1 - Continuous ON

Switch 2 - OFF

Partially open

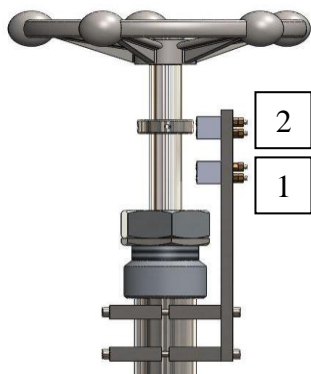
Switch 1 Off

Switch 2 Off



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Fully OPEN

Switch 1 OFF

Switch 2 - Will pulse ON after magnet passes - This pulse can be latched by a PLC to show the valve is fully open

	Shut	Partially Open	Fully open
Switch 1	ON	OFF	OFF
Switch 2	OFF	OFF	Pulse signal

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Installation and Maintenance

Installation Overview

The quality of performance in service is a function of the care taken to ensure good installation. A careful study of these instructions is therefore recommended, as properly installed equipment will normally operate for long periods without problems.

It is important to maintain cleanliness throughout all stages of installation, with particular care not to contaminate the internals of the valve with grease, moisture, grinding dust, weld / brazing spatter or other foreign matter. Clean practices will save time later with reduced flushing and maintenance.

Preparation

Check that there is enough space around the valve installation position to allow removal and refitting of the valve.

Ensure that the valve is closed before commencing installation. Identify the intended flow direction and match the valve orientation with its flow direction arrow.

Ensure that all end connections to the valve are in line and that the pipework is supported to reduce unwanted stresses, loading and vibration on the valve and system pipework.

Ensure that all-joining material / components used with the installation of the valve are compatible, and will not cause any deterioration to the valve structure.

Flanged end connections

Tighten the flange fasteners progressively in a diametric sequence, at the same time as checking alignment of mating flanges.

Butt weld end connections

Ensure that the valve is welded to the pipework in accordance with the necessary approvals.

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Maintenance

Testing

Before introducing pressure to the valve carry out a thorough inspection of all connections: welded and/or threaded. Once pressure is introduced to the valve a method appropriate to the medium being carried by the system should be employed to test for leaks.

For further guidance on leaks refer to troubleshooting notes.

Check that the valve functions satisfactory by operating it under no load.

Check the valve operates freely and smoothly throughout its stroke.

Service Intervals

Bestobell Marine recommends that a major service is carried out on its valves in line with the procedures contained in this manual every 2 years. In addition to this a regular inspection should take place to ensure correct operational condition. Regular inspections are suggested on a monthly basis and maintenance work should be carried out in line with this service manual.

It is recommended that the Service Record Sheet enclosed be completed fully at every service interval.

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Service Kit

Spares Kits

Standard spares kits consisting of bonnet gaskets and gland packing kits are as follows:

It is recommended that only Bestobell LNG approved engineers replace the components in the standard spares kit.

Table A – Spares Kits

VALVE SIZE	SPARES KIT PART NUMBER
DN15	CNMR30
DN25	CNMR50
DN40	CNMR70
DN50	CNMR80
DN65	CNMR90
DN80	CNMRA0
DN100	CNMRB0
DN150	CNMRD0

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Replacing the Bonnet Gasket

Ensure that the valve is open and the line is depressurised before attempting to remove the headwork. Loosen the bonnet nuts and remove the valve headwork and the actuator. Remember to keep the headwork clean.

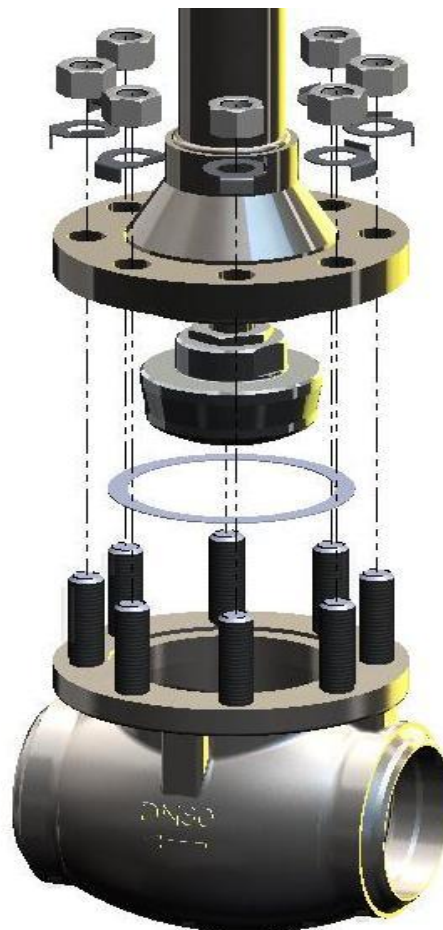
Remove the old gasket and clean the mating faces on the headwork and valve body to ensure that no debris is remaining that could damage the new gasket.

Replace the gasket.

Refit the headwork. Tighten the bonnet nuts progressively, in a diametrical sequence the specified torque settings shown in Table B.

Check that there are no leaks around the gasket seal.

Figure B – Remove Bonnet Gasket



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Bolt Torques

Table B – Bonnet Bolt

Bolt size	Bonnet Bolt Torque
M10	32Nm
M12	56Nm
M16	140Nm
M20	270Nm
M24	420Nm

NOTE:

- Apply torques progressively and in sequence.
- Only use Molybdenum based lubricants.
- Torque specified is for lubricated Stainless Steel fasteners.
- On Cryogenic applications, ONLY use specified Stainless Steel fasteners.
- Torques specified for valves with Graphite body / bonnet gaskets.

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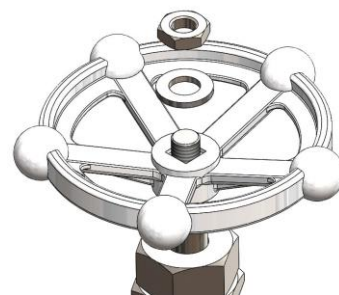
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Replacing the Gland Packing

STEP 1:

Whilst the valve is still in the service line, isolate it and drain off pressure.

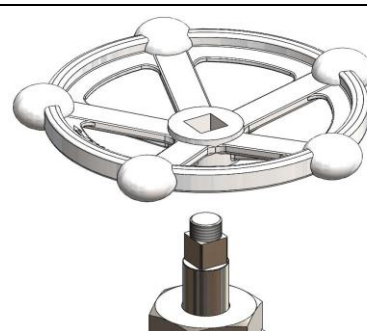
Unscrew the hand wheel retaining nut, lift off the washer and save both parts in a safe place.



STEP 2:

Lift off the hand wheel taking care not to damage the end of the stem.

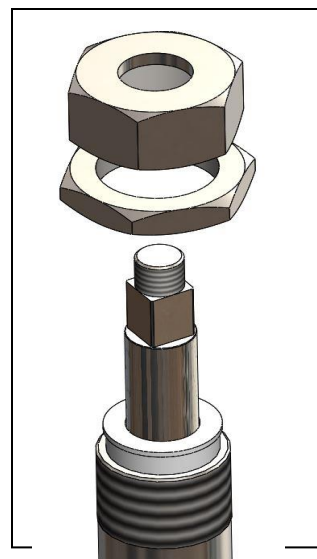
Store the hand wheel in a safe place.



STEP 3:

Using the appropriately sized spanner; unscrew the gland nut and locknut.

Store the parts in a safe place

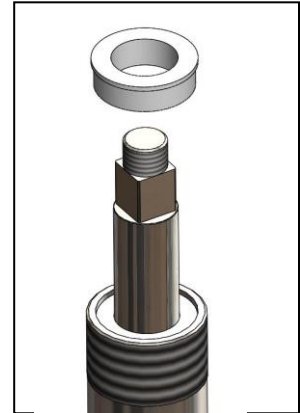


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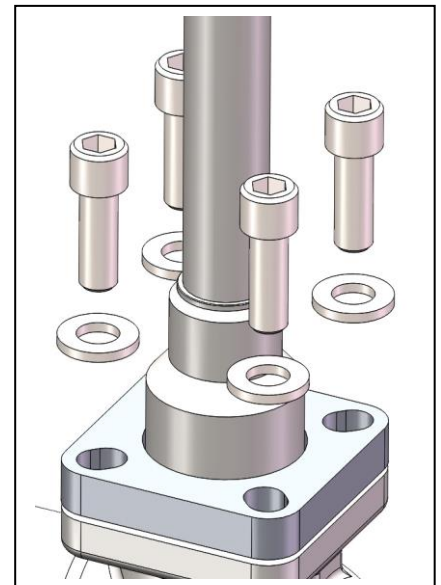
STEP 4:

Remove the Gland follower and store in a safe place



STEP 5:

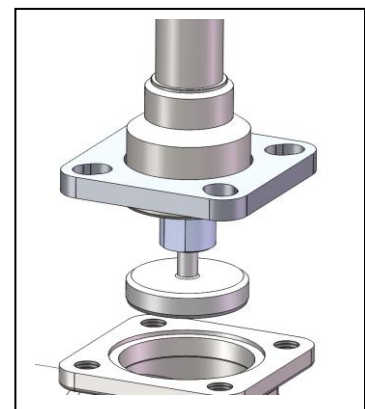
Remove the securing screws or nuts and washers from the bonnet.
Store in a safe place



STEP 6:

Remove the headwork from the body.

Note: Valve disc may remain on the valve seat when headwork is removed.

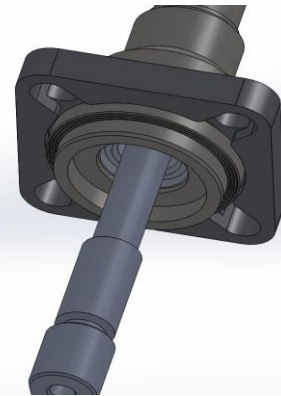


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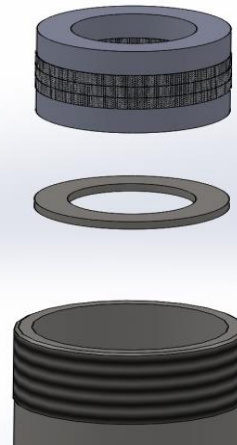
STEP 7:

Remove the stem from the cover.



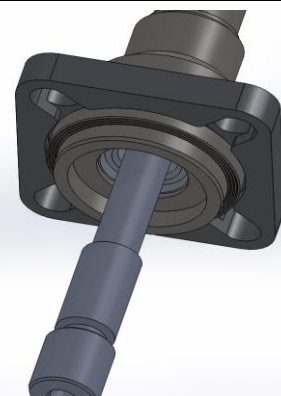
STEP 8:

Remove the gland packing and washer from the inside of the gland area. Take care not to scratch the inside of the gland area. Once removed clean the tube where the packing's are seated removing any of the old packing debris.



STEP 9:

Replace the stem back into the cover



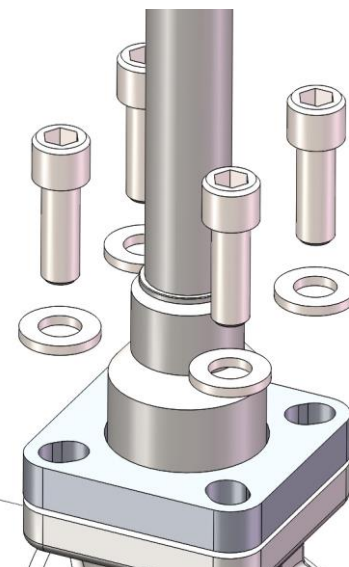
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STEP 10:

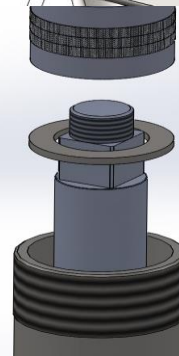
Replace the bonnet gasket from the spares kit discarding the old one. Replace the headwork back into the body ensuring stem fits over disc peg.

Tighten the bonnet Cap screws/nuts progressively, in a diametrical sequence the specified torque settings shown in Table B.



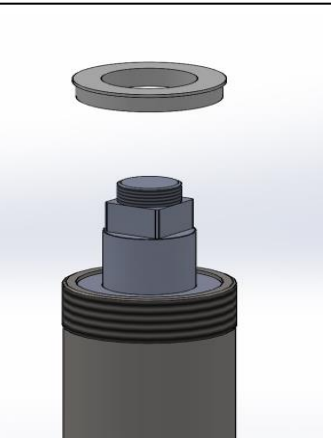
STEP 10:

Replace the gland washer and gland packing from the spares kit back into gland area.



STEP 11:

Replace the gland follower



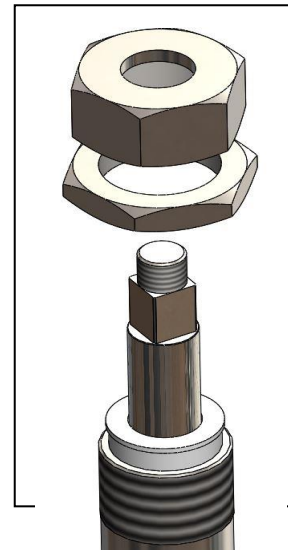
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STEP 12:

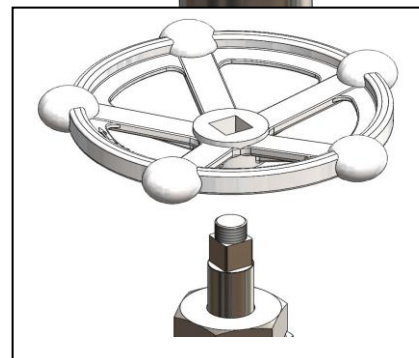
Using the appropriately sized spanner; replace the gland lock nut and gland nut. Tighten the gland nut for the appropriate size of valve to the appropriate torque using the figures from table C.

Once to torque tighten the locknut to same torque against the gland nut



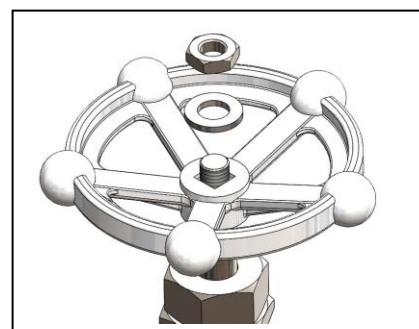
STEP 13:

Replace the handwheel



STEP 14:

Replace the handwheel washer and retaining nut



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Valve Size	Gland Nut Torque
DN15/25	12NM
DN40	30NM
DN50	30NM
DN80	30NM
DN100	20NM X 3 Nuts

Table C – Gland Nut Torques

Testing

Check the bonnet and gland housing areas for leaks.

For further guidance on leaks refer to troubleshooting notes.

Check that the valve functions satisfactory by operating it under no load.

Check the valve operates freely and smoothly throughout its stroke.

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Troubleshooting

Symptom:	Fault:	Solution:
Leaking bonnet	Missing gasket	Fit new gasket
	Damaged gasket	Fit new gasket
	Loose headwork fasteners	Tighten to correct torque
	Dirt on seal faces	Clean seal faces & replace
Leaking flanged end connection	Loose end flange fasteners	Tighten to correct torque
	Misaligned flanges	Align flanges (do not stress misaligned pipe-work with valve)
	Missing or damaged flange gasket	Fit new flange gasket
	Dirt on seal faces	Clean seal face & replace gasket
Excessively tight valve operation	Gland packing compressed too tightly	Loosen gland nuts to allow stem to move freely when valve is operated
	Headwork stem and/or stem tube bent or damaged	Replace complete headwork assembly
	Damaged gland follower	Replace the gland follower
Leaking gland	Worn gland packing	Tighten gland nut to specified
Gland continues to leak after tightening	Gland packing excessively worn	Renew gland packing, re-tighten gland nut to specified torque

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Contact Details

For further maintenance instructions and spares contact:

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